



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of

MIYAMOTO et al.

Application Number: 10/766,206

Filed: January 29, 2004

For: DISK ARRAY APPARATUS

Attorney Docket No. ASAM.0105

**Honorable Assistant Commissioner
for Patents
Washington, D.C. 20231**

Art Unit 2651

PETITION TO MAKE SPECIAL UNDER 37 C.F.R. § 1.102(d)
FOR ACCELERATED EXAMINATION

Sir:

Pursuant to 37 C.F.R. § 1.102(d), Applicant respectfully requests the application to be examined on the merits in conjunction with the pre-examination search results, the detailed discussion of the relevance of the results and amendments as filed concurrently.

Substantive consideration of the claims is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and telephone number indicated below.

Respectfully submitted,

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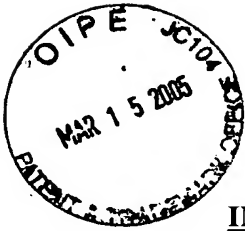
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STATEMENTS & PRE-EXAMINATION SEARCH REPORT
SUPPLEMENTAL TO
THE PETITION TO MAKE SPECIAL

Sir:

Pursuant to 37 C.F.R. §§ 1.102 and MPEP 708.02 VIII, Applicant hereby submits that (1) all claims of record are directed to a single invention, or if the Office determines that all the claims presented are not obviously directed to a single invention, will make an election without traverse as a prerequisite to the grant of special status; (2) a pre-examination search has been conducted according to the following field of search; (3) copies of each reference deemed most closely related to the subject matter encompassed by the claims are enclosed; and (4) a detailed discussion of the references pointing out how the claimed subject matter is patentable over the references is also enclosed herewith.

FIELD OF THE SEARCH

The field of search covered Class 165, subclass 80.3 (U.S. & Foreign); Class 361, subclasses 685 (U.S. & Foreign), 687 (U.S. & Foreign) and 695 (U.S. & Foreign) and Class 454, subclass 184 (U.S. & Foreign). Additionally, a computer database search was conducted on the

USPTO systems EAST and WEST. Examiner Yean-His Chang in Class 361 (Art Unit 2835) was consulted in confirming the field of search.

The search was directed towards a disk array apparatus. In particular, the search was directed towards claims 1-10 of patent application 10/766,206. The claims describe disk array apparatus comprising a plurality of disk boxes taking a rectangular solid shape, each having an air intake plane through which air flows in and an exhaust plane, with a plurality of disk drives installed in each disk box and as further claimed in claims 1-10 in the disclosure provided.

LIST OF RELEVANT REFERENCES

The search revealed the following U.S. and foreign patents, which are listed for convenience:

<u>U.S. Patent Number</u>	<u>Inventor(s)</u>
5,237,484	Ferchau et al.
5,751,549	Eberhardt et al.
6,424,526	Heard
6,563,706	Strickler
6,621,693	Potter et al.
6,819,560	Konshak et al.

<u>Published Patent Application</u>	<u>Inventor(s)</u>
2002/0105782	Huang
2004/0037034	Suzukiet et al.

Foreign Patents

JP 02-266599
JP 02-98197

Inventor(s)

Uno et al.
Takahashi et al.

Discussion of References:

U.S. Patent Number 2002/0105782 of **Huang** shows a heat dissipating device of an extractable disk drive with an extractable disk drive box. However, cold air is absorbed from the front end and lateral sides of the disk drive casing and then hot air is exhausted from the rear side so as to have a preferred heat dissipating effect (Abstract). **Hunag** only force air flow along side/horizontal directions but not in any vertical direction such that **Hunag** does not create “ventilation to flow through planes of said rack respectively perpendicular to the air intake planes of the disk boxes and then through a top plane of said rack” as now recited in claim 1.

U.S. Patent Application Number 6,424,526 to **Heard** shows a high-density disk-array packaging apparatus with a disk drive carrier chassis having open ends that encloses all of the disk drives. Two fans (Fig. 2) are located in the chassis to draw air across the disk drives along side/horizontal directions but not in any vertical direction such that **Heard** does not create “ventilation to flow through planes of said rack respectively perpendicular to the air intake planes of the disk boxes and then through a top plane of said rack” as now recited in claim 1.

U.S. Patent Application Number 6,819,560 to **Konshak** et al. shows a forced air system for cooling a high density array of disk drives with a plurality of disk drives disposed within a second portion of the housing, a first plurality of air flow paths being defined around the disk drives, a plurality of blowers disposed within the third portion of the housing, the blowers drawing air through the upper air plenum (claims). As shown in Fig. 13, although “*air flows into the housing 200 through the rear intake vents 214, front intake vents 232, and side intake vents 234 into an upper air plenum 280,*” “*air finally flows through the rear module air plenum 286 and into the power supply compartment 288 and out of the module housing 200*” for the side (col. 11, lines 1-18), rather than from the top. **Konshak**’s exhaust device 212 disposed at an upper part of said rack (Fig. 8) simply does not suck in “air within said rack from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the

disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device” as now recited in claim 1.

U.S. Patent Number 5,237,484 to **Ferchau** et al. describes a high density electronic module packaging system includes a cabinet for housing a plurality of modules, and a cooling system is disposed at the rear of the cabinet and forming a rear wall thereof for cooling the modules contained in the cabinet (Abstract). However, **Ferchau** only exhausts air form for the side (e.g., Fig. 5), rather than from the top. **Ferchau**’s exhaust device simply does not suck in “air within said rack from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device” as now recited in claim 1.

U.S. Patent Number 5,751,549 to **Eberhardt** et al. describes an electrical assembly that allows a plurality of electronic assemblies to be cooled by a number of fans. The fans induce an air flow from the rack chamber to the fan chamber through the plenum chamber. The plenum chamber provides a uniform pressure that induces an equal flow rate across each disk drive in the rack chamber (Abstract). However, **Eberhardt** only exhausts air form for the side (e.g., Fig. 2), rather than from the top. **Eberhardt**’s fans simply do not suck in “air within said rack from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device” as now recited in claim 1.

U.S. Patent Number 6,563,706 to **Strickler** cools each of power supply modules included in a disk drive array system with a cooling means (Abstract). Fig. 1 shows a top view of the system with air flows (col. 2, lines 29-30, 55-62). However, **Strickler** only exhausts air form for the side (e.g., Fig. 2), rather than from the top. **Strickler**’s fans 45, 50, 70 simply do not suck in “air within said rack from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device” as now recited in claim 1.

U.S. Patent Number 6,621,693 to **Potter** et al. describes a l storage array including a digital data storage unit, such as a rack-mount chassis, and a plurality of digital data storage devices such as disk drives, disposed within the array. **Potter** uses fans *f* to force a “front-to - back” (rather than side flows from side then bottom to top) air flow through or beneath these

sleds cool the drives (Abstract) and then exhausted from the louvers or apertures 5 (col. 3, lines 48-58). **Potter** only exhausts air form for the side, rather than from the top. **Potter**'s fans *f* simply do not suck in "air within said rack from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device" as now recited in claim 1.

U.S. Patent Application Number 2004/0037034 of **Suzukiet** et al. describes a disk array device having a fan module for cooling (Abstract). As shown in Figs. 11-12, **Suzukiet** only force air flow along side/horizontal directions but not in any vertical direction such that **Suzukiet** does not create "ventilation to flow through planes of said rack respectively perpendicular to the air intake planes of the disk boxes and then through a top plane of said rack" as now recited in claim 1.

Japanese Publication Numbers JP 02-266599 of **Uno** et al. describes a disk array device having cooling fan module for cooling. As shown in Fig. 9(b), **Uno** only force air flow along side/horizontal directions but not in any vertical direction such that **Uno** does not create "ventilation to flow through planes of said rack respectively perpendicular to the air intake planes of the disk boxes and then through a top plane of said rack" as now recited in claim 1.

Japanese Publication Numbers JP 02-98197 of **Takahashi** et al. describes a disk array device having cooling fans on top and side (Fig. 7). However, **Takahashi**'s disk units are formed by putting two of the disk boxes "side by side" (rather than "back to back") via a gap therebetween in a horizontal direction with the exhaust planes respectively of the two disk boxes being "aligned with" (rather than "opposed to") each other (Fig. 9). As such, **Takahashi** des not have "each of the disk units being formed by putting two of the disk boxes back to back via a gap therebetween in a horizontal direction with the exhaust planes respectively of the two disk boxes being opposed to each other" while "air within said rack being sucked in from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device" as now recited in claim 1.

CONCLUSION

Based on the results of the comprehensive prior art search as discussed above, Applicants contend that the position calculation method as now recited in independent claim 1, especially the features of “ventilation to flow through planes of said rack respectively perpendicular to the air intake planes of the disk boxes and then through a top plane of said rack,” “each of the disk units being formed by putting two of the disk boxes back to back via a gap therebetween in a horizontal direction with the exhaust planes respectively of the two disk boxes being opposed to each other” while “air within said rack being sucked in from the air intake planes of the disk boxes by said exhaust device so as to pass through the exhaust planes of the disk boxes and the draft path, and being exhausted through the top plane of said rack to outside by said exhaust device” are patentably distinct from the cited prior art references.

In particular, as now recited in the claim 1 (e.g., Figs. 1-2, 5), the disk array apparatus 120 of the invention, comprises: a plurality of disk boxes 300 each generally taking the shape of a rectangular solid, and each having an air intake plane 301 through which air flows in and an exhaust plane 302 provided at an end opposite to that of the air intake plane 301, a plurality of disk drives 310 being to be aligned and installed in each of the disk boxes 300; a rack 200 nearly taking the shape of a rectangular solid, disk units being accommodated in said rack 200 so as to form a plurality of stages in a vertical direction, each of the disk units being formed by putting two of the disk boxes 300 back to back via a gap therebetween in a horizontal direction with the exhaust planes respectively of the two disk boxes 300 being opposed to each other, ventilation (e.g. Fig. 5) being created to flow through planes of said rack 200 respectively perpendicular to the air intake planes 310 of the disk boxes 300 and then through a top plane of said rack 200, a draft path having a width generally equivalent to a lateral width of said rack 200 and extending in the vertical direction being formed by the gaps of the disk units accommodated in said rack 200; and an exhaust device 500 disposed at an upper part of said rack 200, air within said rack 200 being sucked in from the air intake planes 301 of the disk boxes 300 by said exhaust device 500 so as to pass through the exhaust planes 302 of the disk boxes 300 and the draft path, and

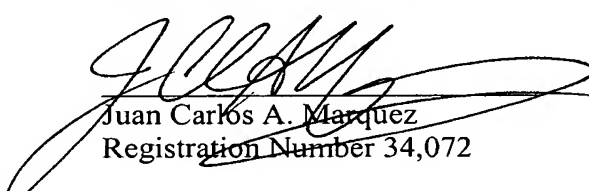
being exhausted through the top plane of said rack 200 to outside by said exhaust device 500. The exhaust device 500 is disposed with a substantially entire surface of an air intake port of said exhaust device 500 facing a cross-section of the draft path.

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references, Applicant respectfully contends that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable consideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

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